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The Economics of Pensions: a non-conventional approach

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Abstract - This paper examines two alternative pension systems, pay-as-you-go (PAYGS) and the capitalisation system (CS) in the light of alternative economic theories. It starts from a critical discussion of the insurance-fiction model of PAYGS proposed by Samuelson in 1958. The pros and cons of that model are illustrated by taking into consideration the non-orthodox views of Keynes, Lerner, Pechman, de Finetti and Eisner. Next the paper investigates the relationship between CS and the marginalist capital theory. It is shown that interpreted in a neoclassical framework CS presents endogenous mechanisms of adjustment to demographic shocks. The problems of the transition between PAYGS and CS are then examined. The paper then discusses some main features of the current US policy debates on the Social Security system. Finally, the alleged advantages of a wider adoption of CS are criticised in the light of the Keynesian theory of effective demand reinforced by the Sraffian criticism of neoclassical capital theory.

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1. Introduction*

In this paper I discuss and compare the economic foundations of two alternative pension systems: the pay-as-you-go-system (PAYGS) and the capitalisation system (CS). The purpose is to contribute to the current debate on the sustainability and advantages of these systems.

After a general description of the functioning of the two systems *à régime*, in Section 3 the paper classifies three alternative interpretations of PAYGS. The controversy centres upon the assimilation of PAYGS to an 'old-age insurance plan' (or 'fully-funded pension plan') originally advanced by Samuelson (1958). He regarded PAYGS as an institutional device whereby each generation can transfer income *through time* and as an alternative to the traditional neoclassical view of capital accumulation as the channel of consumption postponement. Once this interpretation of PAYGS is accepted, the 'defined-contribution' structure of PAYGS becomes its 'natural' actuarial status. Lerner (1959) and others firmly rejected this view, proposing the alternative interpretation according to which PAYGS is a social institution whereby *current* income is shared between *coexisting* generations of employed and retirees. Accordingly, there is not, so to speak, a 'natural' actuarial structure of PAYGS. Being an institution whereby current income is shared between generations, PAYGS cannot suffer from *real* disequilibria. These authors denounce the subtle ways in which the Samuelsonian 'insurance fiction', which leads public opinion to focus upon *financial* disequilibria, has been used to attack PAYGS as unaffordable. In a Keynesian context, the sustainability of PAYGS depends not on demographic factors as such, but on the economic, social and political circumstances that in each period affect the transfer of income between generations.

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Section 4 examines the marginalist capital-theoretic background of CS. We show in what sense neoclassical economists maintain that CS is more apt to cope with demographic shocks. The relationship between CS, the saving rate and capital accumulation is a central issue in the debate on pension reform. For the sake of argument we shall discuss this point by assuming, in accordance with prevailing opinion, that income is at its full employment or 'natural' level. (This is only a provisional assumption made in order to expose more clearly the logic of the mainstream position.) One main question is discussed here is: under what conditions does the *attempt* to extend CS lead to a higher saving rate? This is the heading under which the issue of the 'transition' from PAYGS to CS falls. A Chilean-style transition is first discussed. The nature of the US Social Security 'trust fund' and the 'transition plans' proposed by Martin Feldstein and Franco Modigliani are then examined.

Section 5 discusses the alleged advantages of trying to increase the saving rate to deal with pensions. A criterion due to Aaron (1966), widely used to compare the advantages of using a given amount of freed resources to establish either a PAYGS or a CS, is examined. This test compares the rate of return that workers receive on their contributions from the two systems. However, it improperly extends to the aggregate a criterion of choice valid only at the individual level. Feldstein's (1974) criterion takes into account the aggregate effects of the adoption of each system on the per capita capital endowment and income, finding that the adoption of CS is generally more convenient. We shall make use of Keynes's theory of effective demand, reinforced by the results of the controversy on capital theory, to show that Feldstein's criterion is faulty. We will find that the attempt to substitute PAYGS with CS, to the extent that it succeeds in raising the average propensity to save, may lead to a fall in national income: not only would it destroy PAYGS directly, but it would also undermine its economic basis, worsening the living conditions of both young and old members of the working class.

2. Basic Characteristics of the Two Pension Systems

2.1 Simple Social Security Accounts

As is well known, from the point of view of the national accounts PAYGS is a mandatory *transfer* of income from the employed labour force to the elderly portion of the population. Commonly a public agency, let us call it Social Security (SS), acts as a buffer between the two portions of the population. For the sake of simplicity, let us imagine two equal-sized overlapping generations of young employed and old retired individuals, $N_t^y = N_t^o$ respectively; the subscript t indicates time. Call w_t the given wage rate and α_t the contribution rate. At the end of a selected financial period social security is *financially* balanced if the individual pension benefits b_t and/or the contribution rate have been such that:

$$b_t N_t^o = \alpha_t w_t N_t^y \qquad (1)$$

The PAYGS's budget is, of course, part of the broader government budget. Let us call $B_t = b_t N_t^o$ the aggregate pension transfers, and $T_t^{con} = \alpha_t w_t N_t^y$ the total revenue from contributions, and examine PAYGS within the national income accounts. We assume for the sake of simplicity a closed economy in which the olds receive their income through PAYGS and consume all of it. Pensions are not the only transfer in the economy. Interest payments on government bonds, which according to the rules of national income accounting are also transfers, will be considered later in the paper. As is well known, in national accounting we situate ourselves at the end of the (financial) year, that is, we describe 'what has already happened'. To simplify the notation we omit the subscript *t*.

$Y = C + I + G$ is the usual GNP identity.

$Y_d^y = Y - (T + T^{con})$ is the disposable income of the active workers (the youngs) after non-SS taxes T and social security contributions have been paid.

$Y_d^o = B$ and $Y_d^o = C^O$ are, respectively, the pension benefits having accrued to the olds (equal to their disposable income) and their consumption.

$S^y = Y_d^y - C^y$ is the youngs' savings.

Taking advantage of the preceding expressions, the GNP identity can now be written as $Y = C^y + C^o + I + G$, or $Y = Y_d^y - S^y + B + I + G$, and finally as $Y = Y - (T + T^{con}) - S^y + B + I + G$.

Simplifying and rearranging the terms we get:

$$S^y - I = (G - T) + (B - T^{con}) \qquad (2)$$

The right hand side is aggregate government saving, S^G, which must be equal, though opposite in sign, to private sector net savings (that obtained after subtracting private gross investment). If the aggregate government budget has been in deficit an equal amount of new public debt ($\Delta DEBT$) has been issued equal to the excess of private saving over private investment, that is $S^y - I = \Delta DEBT$.

Assuming that the overall government budget is balanced, then $S^G = 0$. This may be the result of various combinations of surpluses and deficits of the two components of the consolidated public sector. SS can be in the red, and the deficit compensated by the surplus of general taxation over government spending. A more interesting case is that of an SS surplus, that is, $T^{con} > B$, compensated by a deficit in the other component of the government budget, that is, $G > T$. In this case it can be said that SS, which has lent its financial surplus to the rest of the public sector, has figuratively accumulated a 'trust fund' held in public bonds.[1] One should not jump to the conclusion that the future solvency of PAYGS is assured by the accumulation of a 'trust fund' collected in the good years of financial surplus, to be used in the bad years. Indeed, though SS owns a stock of government bonds, the public sector as a whole has not accumulated any asset with

respect to the rest of the economy. The left hand has borrowed from the right hand. If in the future a PAYGS goes into the red, the SS can demobilise its trust fund by selling bonds to the market, but this is precisely what the government would have done anyway to finance the deficit.[2] The truth is that government bonds are not representative of *real* assets and, therefore, they cannot constitute a real reserve fund as in a CS (see below).

To sum up, *prima facie*, from the point of view of the national accounts a 'trust fund' held in government bonds appears as a fiction. The story may take on more complex features once the macroeconomic effects of the policies that led to the formation of an SS surplus (or deficit) are taken into account. But the evaluation of the effects of economic policies depends on the theory adopted. We will postpone this question to Section 4.5 in connection with the debate currently taking place in the US on the SS trust fund.

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[1] In the US, legislation obliges the Social Security adminstrators to manage the trust fund in such a way that, on the basis of the official forecasts, the system will remain in balance for seventy years.

[2] As Wray (1990–91, p. 163) puts it: 'Payroll taxes are currently accumulated in the form of government bonds issued as other government programs run deficits. When (and if) these are sold in the year 2030 to finance Social Security benefit payments of the retirees, the government will have to tax, or borrow from, the workers in that year, in order to retire the bonds. However, a pay-as-you-go system [without a trust fund] would require exactly the same action of taxing or borrowing from workers to provide benefits to the pensioners in the year 2030.' The story does not change if $T^{con} > B$ and $T = G$. In this case the government can use the SS surplus to destroy part of the stock of public debt, and figuratively SS may be said to be accumulating a credit from the government. But this is not a real reserve fund. If SS goes into the red, then the government sector must finance it by issuing new debt.

2.2 *Capitalisation System*

A CS is a fully funded pension scheme in which the reserves are invested in private assets that represent ownership claims on real capital.[3] For the sake of simplicity, let us again consider a stationary economy with two identical overlapping generations. Let the ownership of the capital stock K_t be uniformly distributed among the olds so that each owns k_t. Call a_t the corresponding value of the per capita financial assets so that $a_t = k_t$, with $a_t < w_t$.[4] At the beginning of each period the olds, who own the capital stock, hire the youngs. At the end of the period the per capita product y_t, which belongs to the olds, is distributed as follows (in per capita terms): the replacement of the capital goods consumed in the production process, δk_t, where δ is the depreciation rate; the wage w_t to the youngs; and the return ik_t on the capital advanced, where i is the profit rate. In summation: $y_t = \delta k_t + w_t + ik_t$. The youngs use their wage**s** for two purposes: they consume c_t^y; and through the 'pension funds' they buy the assets a_t from the olds. In summation: $w_t = c_t^y + a_t$. Finally, the olds consume all their financial resources and die. In summation: $c_t^0 = ik_t + a_t$**.** In this economy the capital stock remains unchanged from one period to the next. Indeed there is no net saving since the value of the assets bought by the young is precisely equal to the value of the assets sold by the olds; in other words, the savings of the young are precisely matched by the dissaving of the old. This description of a CS can be easily extended to a steadily growing economy.

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3 In order to keep the argument manageable, we shall suppose throughout this paper that the financial assets held by pension funds represent ownership claims on domestic capital only; that is, we abstract from pension fund investment in foreign securities.

4 This is plausible if the 'periods' last 30 or 40 years (cf. Auerbach & Kotlikoff, 1995, Chapter 3). Alternatively, we can assume an economy with only circulating capital, in which the 'periods' coincide with the calendar year.

3. Interpretations of PAYGS

3.1 Samuelson's Fairy Tale

The most widespread economic interpretation of PAYGS follows a classic contribution by Samuelson (1958). It can be summarised thusly: Equation (1) illustrates the *financial* equilibrium of PAYGS. Let the wage bill to grow at a rate λ (approximately) equal to the summation of the rates of growth of employment and of productivity. This means that $w_t N_t^y = w_{t-1} N_{t-1}^y (1+\lambda)$. Or, since, $N_t^0 = N_{t-1}^y$:

$$w_t N_t^y = w_{t-1} N_t^0 (1+\lambda) \tag{3}$$

The financial balance of PAYGS now allows a positive rate of return equal to λ on the contributions paid when young. Using Equation (3), equation (1) now reads:

$$b_t N_t^o = \alpha_t w_{t-1} N_t^0 (1+\lambda) \tag{4}$$

Defining $\rho_t = b_t / w_{t-1}$ as the *replacement rate*, that is the ratio between benefits and the past wage rate, the condition of financial solvency (4) simplifies into:

$$\frac{\rho_t}{\alpha_t} = (1+\lambda) \tag{5}$$

Written as $\rho_t = \alpha_t (1+\lambda)$, this expression tells us how under PAYGS, contributions (as a share of a given wage rate) translate into pensions (as a share of the same wage rate). Of course, λ can be zero or even negative, as we shall see later. How much will the workers decide to 'invest' in this system?

According to Samuelson (1958) PAYGS can be likened to a fully funded private pension scheme (or 'old-age insurance scheme'). Accordingly, a worker would voluntarily contribute to PAYGS the same amount of income that she or he would have saved had she or he made the standard textbook decision between present and future consumption when the interest rate was λ. Samuelson claims to show that, in principle, PAYGS is consistent with the rational (utility maximising) behaviour of individual agents. Would then these decisions be collectively optimal? If individual preferences are constant through generations, the answer is affirmative. Suppose that in

period t–1 the share of the real wage w_{t-1} that the youngs intend to transfer at a given λ to the future is precisely α_t. As a result they transfer $\alpha_t w_{t-1} N^y_{t-1}$ to the current olds (and, *figuratively*, to themselves when old). In period t they expect $\alpha_t w_{t-1} N^y_{t-1}(1+\lambda)$ which is precisely what the youngs of period t intend to transfer to them (and *figuratively* to themselves into the future), since $\alpha_t w_{t-1} N^y_{t-1}(1+\lambda) = \alpha_t w_t N^y_t$. As (Samuelson, 1958, p. 471) puts it, 'In a stationary system everyone goes through the same life-cycle, albeit at different times. Giving over goods now to an older man is figuratively giving over goods to *yourself* when old.' The rate of return λ is defined as 'biological' by Samuelson.

Given the contribution rate α_t, the PAYGS system depicted by Samuelson is technically a 'defined-contribution' system in which each worker is promised she will receive, when old, the contribution she paid when a young employee, revalued at the rate λ. Viewed in this way, the system is similar to a private pension scheme. Clearly, there is no reserve fund to guarantee the promise. In its place is a 'pact between generations'.[5] We shall return later to Aaron's (1966) suggestion that PAYGS is more convenient as long as λ, the 'biological' rate of return on transfers, is higher than the interest rate yielded on one's own savings invested in an individual life pension scheme.

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[5] Samuelson argues that PAYGS cannot be an outcome of a market transaction — 'Outside social security and family altruism, the aged have no claims on the young: cold and selfish competitive markets will not teleologically respect the old' (1958, p. 473) — and concludes that 'Once social coercion or contracting is admitted into the picture ...[t]he reluctance of the young to give to the old what the old can never themselves directly or indirectly repay is overcome. Yet the young never suffer, since their successors come under the same requirement. Everybody ends up better off. It is as simple as that' (ibid., p. 480). However, the complex historical, economic and social circumstances that gave rise to the modern mandatory PAYGS are left unanalysed. Samuelson focuses only on showing the consistency of PAYGS with individual maximising behaviour.

3.2 The Lerner–Samuelson Controversy

The assimilation of PAYGS to an individual pension scheme was ferociously criticised by Abba Lerner (1959), who argued that 'In the ... economy considered by Samuelson, where no investment is even *possible*, there is no excuse whatever for thinking of saving as a social transfer of consumption through time. … The only *real* problem from the social point of view is the allocation of current output of consumption goods between current consumers of different age. ... It is only a somewhat more sophisticated fable that today's transfer from workers to pensioners is a "repayment" of yesterday's transfer from workers to pensioners' (ibid., p. 517, italics in the original). In addition, he characterises the 'biological' interest rate as 'fictitious'. And indeed, in the national accounts there is no trace of any 'biological' interest rate. The sceptical Lerner adds that only with reference to capital accumulation is there '*some* justification for the view that consumption can be postponed and earn interest' (ibid., italics in the original).

In his reply Samuelson 'shamelessly denied all the charges' (Samuelson, 1959, p. 521), arguing that, of course, PAYGS was *not* a transfer of consumption through time, but that one could reason *as if* it was. Lerner counterattacked by replying that this way of thinking implies that PAYGS must be regarded as a 'chain letter', in which each generation is promised that its transfers will be refunded in the future with a positive rate of return: 'Samuelson's fairy tale is not that of the time-travel of interest-collecting savings, nor did I suspect him of that addiction. But in succumbing to the fairy tale of the endless chain letter and the divergent infinity he plays into the hands of those who *are* so addicted' (Lerner, 1959, p. 525, italics in the original). Consistently with national account definition**s**, according to Lerner it 'is nothing but a device by which today's pensioners are maintained out of today's social product, which is, of course, produced by today's workers' (ibid, p. 524). Very similar propositions were expressed a few years earlier by the great Italian mathematician Bruno de Finetti (1956). Notably, de Finetti regarded PAYGS not as an actuarial problem, but as one of social and economic policy.

3.3 Relevance of the Controversy

Perceptive economists accept that PAYGS is a 'tax-transfer' system.[6] Not all do, however. Three positions can be identified, according to which the assimilation of PAYGS to an individual pension scheme: (i) gives it its 'natural' status; (ii) is a 'fiction', but has nonetheless various roles to play; or (iii) is a pernicious 'fiction' aimed at discrediting PAYGS. Let us examine them briefly.

(i) A first group of economists, particularly influential in Italy and Sweden, where they have contributed to recent PAYGS reforms, sticks to the Samuelsonian view and regards the defined-contribution configuration of PAYGS (that is the 'insurance fiction') as 'an extraordinary mechanism, *theoretically founded*, which, through the automatic adjustment of the rate of return would endow PAYGS with an "automatic pilot", or an "invisible hand", able to provide benefits consistent with the resources available in each period' (Gronchi, 1998, p. 299; my translation, italics added). Consider Equation (4) above. It says that if λ falls or actually becomes negative, the *financial* balance of PAYGS is preserved if either α_t rises, or ρ_t falls. With a defined-contribution system the weight of the adjustment falls on ρ_t (whereas with a defined-benefits system it would fall on α_t). But there is nothing '*extraordinary*', or even '*theoretically founded*' in this. As a Swedish commentator notes (Cichon, 1999, pp. 93–94), 'it is often claimed that the NDC [Notional defined-contribution] systems are ... automatically in annual financial equilibrium. This can only be true if beneficiaries ... bear the full risk of demographic change ... as well as adverse economic developments (as expressed in lower wages and contracting levels of employment). Otherwise, changes in fertility or a contraction of contribution income due to economic difficulties would put

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6 For example, Peter Diamond (1981, p. 167) has argued that 'it's totally different to talk about the system as a whole having a rate of return, the way many people do in pay-as-you-go calculations. If you want to believe these calculations, you have got to believe that things are going to go forever, which is an awfully long time to believe anything. Unless you believe things are going forever, social security is a tax-transfer system.'

an NDC scheme with a constant contribution rate in a similar financial problem to any PAYGS scheme.' [7]

(ii) The second group of economists clearly perceive the 'tax-transfer' nature of PAYGS. However, they maintain that the insurance *fiction* has a number of roles to play.

Likening social security to an individual pension scheme makes PAYGS more acceptable to the capitalist ideology of self-reliance.[8] However, it is argued, the fiction may also be more popular with the population at large (Beveridge, 1942). In particular it can be relevant to the self-esteem of the working class who would prefer to regard pensions as an acquired right and not as charity from the community or from the State (Thompson, 1983, pp. 1459–1462). In addition, by linking the level of benefits to that of contributions, the 'insurance fiction' makes the working class aware of

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[7] The defined-contribution configuration is endowed with a 'self-regulating mechanism' in which the retirees bear all the risk also with regard to increases in longevity. Intuitively, given the amount of contributions paid by each individual over his or her working life, this is returned over the pension period subdivided in 'annuities'. In the case of a lengthening of the retirement period, the system will automatically reduce the annuities. In practice it will diminish ρ_t.

[8] 'In our society many people feel that social security by redistribution of income by the government is alien to the pure essence of the individualist capitalist system so that, if "social security" has to be provided, it should take the form of individual saving for the old age. This has led to the belief that a social security system cannot operate honestly unless it has acquired a fund actuarially corresponding to the savings of all those members of society who have paid in their contributions in the past and who will be taking them out as benefits in the future' (Lerner, 1959, pp. 516–517). Answering in July 1942 'a note raising the question of the wisdom of maintaining the fiction of the fund principle, which in the past had linked contributions and benefits closely, and suggesting that the Beveridge proposals be treated for what they were, a scheme for social benefits financed in part by contributions from the potential beneficiaries but primarily by general taxation' (Keynes, 1942, p. 223, editor's note), Keynes wrote: 'The fixed weekly contribution is a poll tax on the employed and an employment tax on the employer — both very bad kinds of tax... . But the formal conversion of the contribution into a tax should have, unless it is purely formal, far reaching consequences... I hope that we shall soon be ready to accept such consequences. But it may be that this is to move too far ahead of the political or even of the administrative climate.'

the costs of the system and helps to keep the financial aspect sound (Beveridge, 1942, p. 78).[9] Finally, while the *fiction* discourages claims for increased pensions, it may also protect their actual level. In this sense it has authoritatively been argued by Richard Musgrave that 'it is essential to view Social Security as a contractual arrangement that assures each contributing generation of their own support by the subsequent generation.' This would protect the system 'against the vagaries of the political swings' (Musgrave, 1981, pp. 99–100). Musgrave himself favoured an actuarial arrangement whereby workers and pensioners would both share the risk of a change in the economic circumstances that affect PAYGS performance (in terms of Equation (5) the consequences of a fall of λ would affect both α_t and ρ_t).

(iii) Although sensible to Musgrave's arguments, the last group of economists point out that 'the fiction that social security is not a program to redistribute income has helped keep its broad political support, but it has also opened up a possible avenue for attack from those who never liked the idea' (Meeropol, 2000, p. 122). [10] So they tend to maintain that the best way to defend PAYGS is to recognise its nature as a 'tax-transfer' system, a social arrangement whereby the working portion of the population supports the non-working portion. Pechman, for instance, argue**s** that PAYGS is 'an institutionalised compact between the working and non-working generations' and

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9 Keynes's post-war budget concerns led him to write: 'Sir William Beveridge has promised to put emphatic passages in his report calling attention to the financial difficulties, arguing that the finance of the scheme stands or falls as a whole and that there is no room for further concessions except in return for increased contributions, and generally emphasising the contributory character of the plan so that the rights of those who have not contributed in the past will be legitimately limited' (Keynes, 1942, p. 246). The long struggle in the first half of the twentieth century between the British trade-unions, which favoured a 'tax-transfer' system, and the Treasury, which favoured a defined-contribution system, is effectively described by Macnicol (1994).

10 Joseph Pechman describes this sort of attack in the following terms: 'It is hysterical nonsense to talk about bankrupting the system; it is idiocy to generate the mass public's sense that there's a big bank somewhere and that if there's not enough money there will be a run' (as reported by Skidmore, 1981, p.3).

concluded: ‘When viewed in this light, a Social Security program has the eminently desirable function of forcing upon society a decision at each point of time on the appropriate division of income and consumption between workers (the young) and nonworkers (the old, survivors and disabled)’ (1989, p. 175). This view makes it more difficult to talk of a PAYGS crisis even if the underlying conditions change. This is so because (a) PAYGS is not an individual pension scheme committed to returning past contributions with interest since, once it is recognised as a tax-transfer system, ‘no individual is promised a refund of his tax, let alone interest’ (Lerner, 1959, p. 524; cf. also de Finetti, 1956, p. 285; Eisner, 1998); and (b) it seems alarmist to argue that the reproduction of the economy will be jeopardised in the next future by an increase in the amount of resources transferred to the olds (cf. Baker & Weisbrot, 1999).

3.4 An Assessment of the Controversy

A dilemma emerges from the last two positions: on the one hand PAYGS is a social device whereby active workers support the elderly portion of the population, the level of support being a decision of social policy (Lerner, Pechman); on the other hand the consensus to PAYGS depends on the expectations held by the participants, and these cannot be left hostage to ‘political vagaries’ (Musgrave). Both positions are sensible (all current participants in PAYGS want to support their parents now and want to be supported themselves when old). However, no insurance fiction guarantees that this will always be the case. As we have seen, what a defined-contribution scheme can assure is the preservation of the *financial* equilibrium of PAYGS, but at the cost of a diminished consensus. No actuarial engineering can save PAYGS. Precisely because PAYGS is not a ‘fully-funded pension scheme’, but is based on the transfer of current income, the fulfilment of the expectations of the participants depends not just on demographic factors, but on a significant degree on the growth and distribution of the social product. So the question becomes whether the rate of increase of the wage bill, on which the consensus for and sustainability of PAYGS depends, is ultimately regulated by equilibrating market forces and exogenous demographic factors, or else is a

question of policy within which the demographic factors have to be considered. Conventional economists tend to believe the former, whereas non-orthodox economists hold the opposite view. We shall come back later to the relation between demographic factors and policy in a Keynesian context.

4. Capitalisation System, Saving and Capital Accumulation

4.1 Interpretations of the CS

As seen above, the CS works as a 'relay race' between generations in which the baton is the capital stock (or its financial counterpart, the assets owned by the pension funds). Let us consider, for the sake of simplicity, a stationary economy with a CS *à régime* and a given capital stock. The past investment decisions that gave rise to the existing capital stock may be explained either in Keynesian or in marginalist terms. According to the former approach, gross investment is independent of saving, while in the second approach the opposite is true. Nowadays, most economists favour the second explanation; so let us examine this second interpretation, which is based on marginalist capital theory.

The capital stock, heterogeneous in nature, must of course be measured according to some homogeneous standard. According to the marginalist approach, the variety of physical capital goods have a common origin precisely in the amount of consumption goods whose enjoyment individuals decide to postpone to the future. As Garegnani sums up:

> Beneath the variety and, at times, the vagueness of the indications given in this respect by the marginalist theorists, there lies a common idea. The capital goods, and hence the quantity of capital they represent, result from investment; since investment is seen as the demand for savings, 'capital' emerges as something which is homogeneous with saving. Its natural unit is therefore the same as we would use for saving, i.e. some composite unit of consumption goods capable of measuring the subjective satisfactions from which (according to these theorists) consumers abstain when they save. 'Capital' thus appears as past savings which are, so to speak, 'incorporated' in the capital goods, existing at a given instant of time. As a

> result of the productive consumption of those goods, these past savings will periodically re-emerge in a 'free' form and can be re-incorporated in capital goods of the same or of different kinds; alternatively, they can be turned back into consumption. (1983, p. 33)

It is to this conception that the supporters of the CS refer: by selling the assets they possess to the fully employed youngs, the olds (also previously fully employed) are able to recover the consumption goods 'crystallised' in the capital stock, while the constancy of this 'consumption fund' is assured by the renewed abstention from consumption of the youngs. In a stationary economy, the dissaving of the olds is precisely matched by the saving of the youngs so that the amount of consumption goods 'incorporated' in the capital stock remains constant. In this setting the pension funds just act as buffers between the overlapping generations.

This view of capital as a fund of consumption goods also fits very well into Modigliani's life cycle model, in which the provision of an income for the retirement years, the 'foresight motive' as Keynes defined it, is the main explanation of saving decisions made during the working years. The marginalist principles assure that, for a given labour supply, substitution among consumption goods or among productive factors (e.g. Solow, 1970, pp. 15–16) leads any increase in agents' saving decisions to increase the average capital endowment per worker. These traditional views are behind the most recent models of balanced growth with overlapping generations and CS (e.g. Auerbach & Kotlikoff, 1987; Romer, 1996, Chapter 2) and, more importantly, Feldstein's (1974) influential case for adopting a CS (see below Section 5.2).

The neoclassical approach to CS excludes any 'intergenerational conflict' due to demographic factors. Two demographic changes are relevant here: a fall in fertility and an increase in longevity. We begin by looking at the first of these changes. Suppose that the number of youngs starts to decline. Part of the assets held by the olds may not find a market, at least at the expected price. However, by declining to replace part of the capital goods that have worn out in the course of time, the system can recover the consumption goods crystallised in the assets not desired by the

youngs (cf. Samuelson, 1975, p.533–534 and the final sentence of the quotation from Garegnani given above).[11] Moreover, in a standard neoclassical model of economic growth a decline in the rate of growth of the labour force leads, *ceteris paribus*, to higher per capita capital endowments and income, what has been dubbed the 'Solow effect' (Elmendorf & Sheiner, 2000, p. 60).

With regard to improvements in life expectancy, in the short run they may be dealt with by a reduction in the annuities that the olds receive from the pension funds. This would be accomplished by the funds adopting a policy of spreading the sale of the assets owned by the olds over longer spans of time so as to distribute the proceeds over the entire life of the pensioners. As a result in each period the consumption of the olds falls. This implies that there is net savings in the economy. In practice in each period the youngs would find a lower amount of assets offered in the market, so that part of their saving supply is translated, according to the neoclassical principles, into net capital accumulation. A simple simulation with two overlapping generations and a Cobb-Douglas production function (using the hypothetical data of Auerbach & Kotlikoff, 1995, Chapter 3) shows that in the long run this has a positive effect on the welfare both of the youngs and of the olds. If in the first period the olds postpone ¼ of their consumption to the next period to cope with an expected increase in lifespan, in the long run the capital stock, total income and the real wage will, respectively, be 62%, 16% and 16% higher, and the olds can enjoy a more than satisfactory retirement income in the second period while obtaining the same initial consumption in the first retirement period. To sum up, not only is the neoclassical CS in principle able to cope with demographic shocks, but the adjustments are beneficial to the population.

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[11] That this can easily happen in practice is a source of great concern among mainstream economists who are worried about what will happen when the baby boom generation retires and starts to sell their financial assets (e.g. Kohl & O'Brien, 1998, p. 9).

4.2 Capitalisation System and the Saving Rate

The causal link that runs from the 'foresight motive' for saving to capital accumulation may lead those who argue along conventional lines to the conclusion that the mere existence of a CS is *necessarily* associated with a higher share of saving in income. This is too hasty a jump. For instance, a CS may not exist and retirement may have to be satisfied by a PAYGS, yet the saving rate may be higher than in other economies that adopt a CS. Let us consider two economies, one with a PAYGS and the other with a CS, with net incomes of Y_{paygs} and Y_{cs} respectively. In the first a share of income B/Y_{paygs} is transferred to the olds who save $S^o < B$. The youngs consume all their disposable income $Y_{paygs} - B$. The net saving rate is S^o/Y_{paygs}. In the economy with CS, the youngs transfer the same share of income to the olds as in the first economy by buying an amount A of assets, that is $A/Y_{cs} = B/Y_{paygs}$, and consume the remaining income. In this case, however, the olds do not save. In the second economy the net saving rate is zero. To sum up, even arguing along conventional lines, *in principle,* an economy with PAYGS and no CS may well save more than one with CS and no PAYGS.

4.3 The Question of the Transition

The question whether an *à régime* CS is associated with a higher saving rate overlaps with the question of whether the privatisation of the pension system leads to a higher saving rate. This raises the so-called 'transition problem'. The prevailing opinion is that it would be advantageous to reform the pension system *as long as this raises the saving rate* (e.g. World Bank, 1994; OECD, 1998; Aaron et al., 2001, p.17). This of course cannot be accomplished without causing a fall in the consumption either of the youngs or of the olds.

For the sake of argument let us adopt the provisional assumption, which is standard in most discussions of pension policy, that the economy is operating at full employment (or at some 'natural' rate of unemployment). This is tantamount to assuming that all saving translates into

investment, a key assumption for the neoclassical view of pensions. She or he is strongly warned that this assumption is only made in order to understand the mainstream reasoning, and to identify the cases in which mainstream economists, or their critics, are inconsistent. The neoclassical assumption will be criticised in Section 5.3. For the time being *Y* is assumed to be at its full employment level.

We know from Section 2.1 above that $Y_d^y = Y - (T + T^{con})$, and $S^y = Y_d^y - C^y$. As before, for the sake of simplicity, we assume $C^o = B$ and $T^{con} = B$. We thus get:

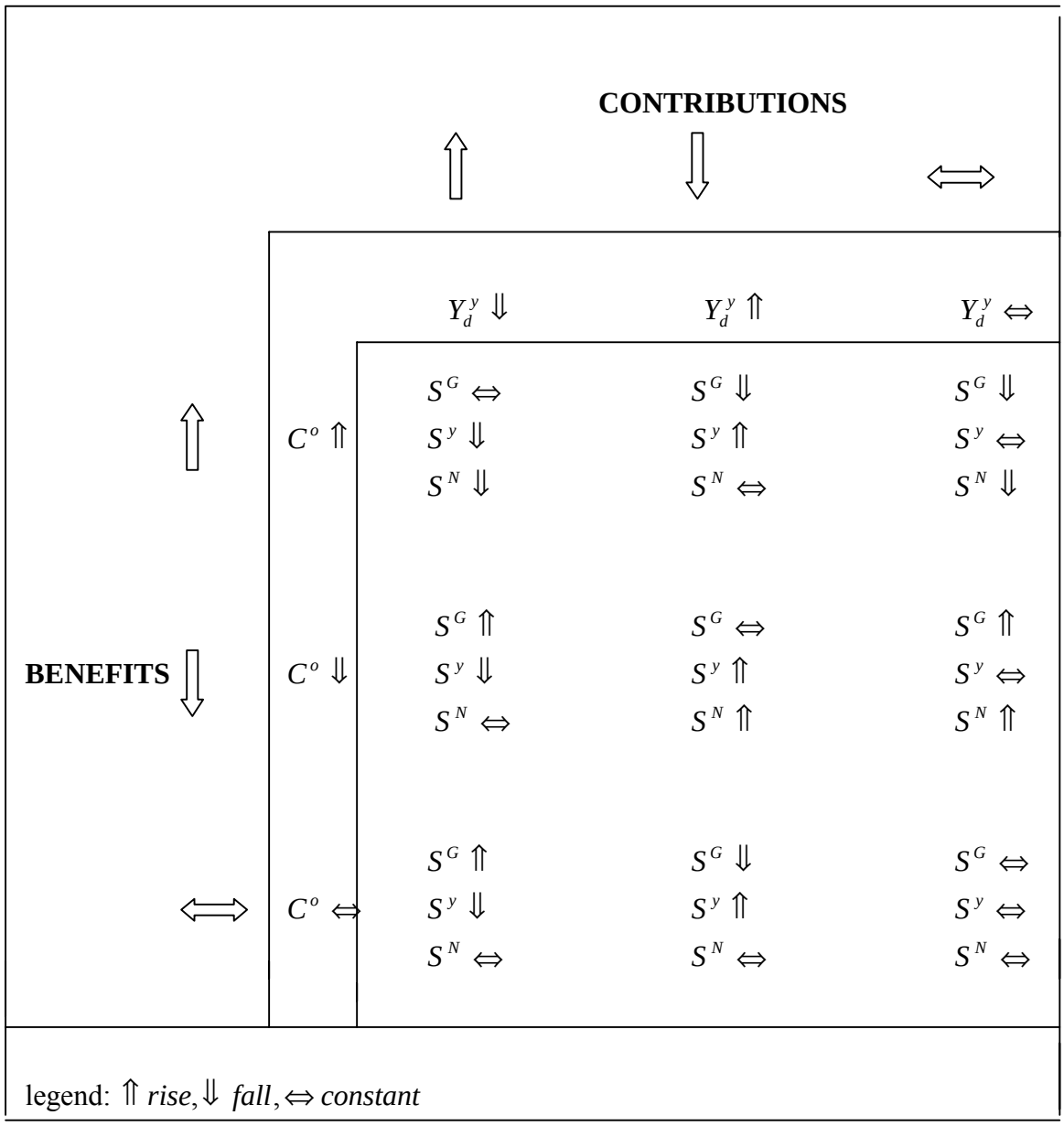
$$S^y = Y - (T + T^{con}) - C^y .$$

A rise in private saving S^y given C^y, implies a fall C^o (therefore in both T^{con} and *B*). If this is not politically feasible, S^y cannot rise.

Alternatively, a higher national saving rate can be obtained for given levels of private savings by realising a larger government surplus (or by reducing the deficit), that is by raising S^G by obtaining a surplus of SS. It is useful to reconsider this point using Equation (2) above. This can be rewritten as the summation of the private (youngs') savings and of government savings: $S^y + S^G = S^N$, where S^N is national saving (and $S^N = I$). A fall in both *B* and T^{con} would leave the government saving, S^G, unaffected, but as we have seen, the fall in T^{con}, *B* and C^o allows S^y to rise. Given the 'natural' level of income, this leaves room for a rise in *I*. Cuts in *B*, whether accompanied or not by increases in T^{con}, may give rise to a social security surplus and a rise in S^G, as recently happened, for instance, in the US.

Given the simplification made in the text that $C^o = B$, C^y constant, and for given levels of *G* and *T*, a simple matrix, shown below, may be used to summarise the expected effects of the variations of T^{con} and *B* on, respectively, private (youngs') and government savings. Note that in order for S^N to rise, *B* (and thus C^o) must fall. Variations of T^{con} merely redistribute income between the government and the private sector. For the sake of simplicity we have kept C^y constant. It is

however possible that when T^{con} rises and Y_d^y falls, then both C^y and S^y, and not just the latter, fall.



However, a larger government surplus has nothing necessarily to do with pension reform. As Cutler (1999, p. 128) puts it, 'there is no reason why this additional saving need be done through Social Security. One could just as easily raise non-Social Security taxes and cut non-Social Security spending and build up the same surplus.' The achievement of a surplus in the SS budget appears politically sensible only in view of the alarm raised by conventional scholars and institutions about population ageing: 'Since the problems of ageing show up particularly acutely in old-age insurance ... there is a reasonable argument to make for saving more through Social Security' (ibid.). That is,

cuts in *G*, accompanied or not by a rise in *T*, may also, for given levels of private savings S^y, increase national savings; or cuts in *G* accompanied by cuts in *T* may lead to a similar rise through an increase in S^y for given levels of S^G. In this case S^N increases only if *G* (that is social consumption) falls. A rise in *T* only redistributes income between the government and the private sectors. But the alarm that surrounds PAYGS has made it more politically acceptable for the desired rise in S^N to be delivered by realising an SS surplus. According to the dominant view, given the 'natural' level of income and of private savings, this implies an increase in *I*.

4.4 Privatised PAYGS

Suppose now that contributions are reduced by $\left|-\Delta T^{con}\right|$ in order to increase the youngs' disposable income and that their *mandatory* savings (paid into privately or publicly managed pension funds) are increased by $\Delta S^y = \left|-\Delta T^{con}\right|$, but *without* correspondingly decreasing *B*. Government savings have fallen by $\left|-\Delta S^G\right| = \left|-\Delta T^{con}\right|$, so that S^N does not change (given that $\Delta S^N = \Delta S^y - \Delta S^G = 0$). Indeed, the government must offset the fall in T^{con} either by raising general taxation by $\Delta T = \left|-\Delta T^{con}\right|$, so that the youngs' disposable income is unchanged and, in first approximation, S^y does not rise; or it can issue new debt by $\Delta DEBT = \left|-\Delta T^{con}\right|$. The new debt is exactly equal to ΔS^y, that is, it is exactly matched by the rise in private savings that finances the larger SS deficit. That S^N has not risen is not surprising, given the fact that neither C^y nor C^o has fallen.

In practice, in the second case the government starts to finance part (or all) of the pension benefits by issuing new debt instead of collecting contributions. What we get is a *disguised* PAYGS system that is financed not through contributions but by issuing public debt. This is bought up by pension funds that collect the mandatory savings of workers. We may also call it a *false* CS system, that is, one that invests pension funds in public bonds and not in private assets.

It is said that this arrangement may be more convenient for pensioners as long as the interest rate paid on public bonds is higher than the Samuelsonian 'biological rate' on contributions, that is as long as $i > \lambda$. This is not necessarily so. Suppose that in a stationary economy with two overlapping generations, the younger (active) generation is offered the possibility of opting out from Social Security at the beginning of the period, and putting its contributions in new private pension funds. As seen above, the pension funds will use the contributions to buy $\Delta DEBT$ issued by the government to finance the Social Security debt owed to the older (retired) population. At the end of the period the youngs will receive $\Delta DEBT\,(1+r)$, where r is the interest rate on government bonds. However, the interest payment implies that taxes have had to be raised by $r\,\Delta DEBT$, so the youngs are actually paying that interest to themselves (Geanakoplos, Mitchell & Zeldes, 1998, pp. 14–17; Amato & Marè, 2001, pp. 221–232).

These look like meagre results for pensions reformers. It has gradually been admitted (see among others Diamond 1996; Gale, 1997, pp. 73–74; Geanakoplos, Mitchell & Zeldes, 1998; Cutler, 1999, pp. 125–126; Orszag & Stiglitz, 1999, p. 9) that this is precisely the 'pathbreaking' kind of reform that has taken place in Chile (and in other countries), where only the existence of a government surplus realised in the years of the pension reform by cuts in non-pension public spending G prevented the reform from leading to public deficit (Valdés-Prieto, 1997, p. 205). In Mexico, the new pension funds were obliged to invest in government bonds, 'thus privatising without diversifying' (Geanakoplos, Mitchell & Zeldes, 1998, p. 4).[12] One of the academic fathers of Chilean pension reform candidly admits that this kind of change — which he calls 'apparent funding', or 'neutral relabeling' of PAYGS — does not 'attempt to increase national saving' (ibid.,

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12 In this regard, Diamond writes that 'While the issue of additional capital accumulation is usually discussed in terms of the transition, it is worth noting that completion of the phase-out of a pay-as-you-go defined benefit system does not necessarily mark a stage with higher capital, since completion of a debt-financed transition leaves a higher level of explicit debt, roughly offsetting the

p. 191). So further economic arguments have to be enlisted to justify this 'neutral relabeling' experiment. One concerns the effects of this sort of reform on the labour market (e.g.Corsetti & Schmidt-Hebbel, 1997). A second regards the diversification of the assets held by the pension funds, which only at the beginning have to be public bonds, but which can later be traded for private or international assets in order to raise the rate of return (Valdés-Prieto, 1997, pp. 208–213; Orszac & Stiglitz, 1999). A third argument is related to the political 'insulation' of the pension system from the political process once pension rights are guaranteed by government bonds (eventually tradable for other assets, according to the second argument) (Valdés-Prieto, 1997; p. 201; Diamond, 1996). These ancillary arguments are rather *ad hoc* and clearly a matter of debate even among mainstream economists. For a criticism of the effects of the Chilean-style reforms on the efficiency of the labour market cf. for instance Cutler (1999, pp. 129–131). The second argument may involve changes in the national interest rates to induce foreigners to hold the government bonds that pension funds exchange for foreign assets, increasing risks etc. (see Singh, 1996). The third argument is also suspicious given that the disguised PAYGS cannot but suffer of the same (alleged) troubles of the standard PAYGS.

With regard to the sort of pension reform discussed in this Section it can safely be concluded that: (i) it does not in itself increase the saving rate, and (ii) as an admitted relabeling of PAYGS, it cannot meet the alleged pending collapse of PAYGSs which has given rise to most of the fuss about pension reforms.

4.5 The Role of the SS Trust Fund in the US Debate

We concluded Section 2.1 arguing that from the point of view of the national accounts an SS 'trust fund' held in Treasury bonds is a fiction. We warned however that the story had more complex

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accumulation in the new funded system' (1996, p. 79). The spurious nature of this kind of reform had already been clearly pointed out by de Finetti (1956, p. 279) and Thompson (1983, p. 1445).

implications once the macroeconomic effects of the policies that led to the formation of an SS surplus (or deficit) are taken into consideration.

Baker & Weisbrot (1999) reject the argument that the trust fund is a mere fiction. As they put it, according to the fiction thesis, 'when the trust fund cashes in its bonds, the government will have to find money somewhere. So Social Security — or some other spending — will have to be cut.' In other words, the argument dismisses the 'fund's assets as "mere pieces of paper" or "the government owing money to itself"' (ibid., 1999, p. 28). Yet, their objections are not objections at all. They admit indeed that 'the government will have to borrow from other sources as the Social Security surplus shrinks', but that 'its need to borrow has nothing to do with the solvency of the Social Security system' (ibid.).

Unfortunately, the need to borrow by the government does have something to do with the solvency of SS, since the accumulation of Treasury bonds is not an accumulation of real assets, which — let us follow the neoclassical argument — can be reconverted from capital to consumption goods. This accumulation would have taken place, Baker & Weisbrot say, if the SS 'trust fund were invested in private stocks and bonds rather than government bonds' (ibid.). But they have not been invested in that form. So Baker & Weisbrot are not authorised to neglect the macroeconomic consequences — increasing government borrowing or cuts in other items of social spending — of the depletion of the trust fund. But they insist that 'the fact that the Social Security system has loaned its surplus to the federal government rather than having invested it in private stocks or bonds should not be used to make Social Security beneficiaries pay, in the form of reduced benefits, for any fiscal tightening that may be applied to the rest of the budget' (ibid., p. 29). This argument, which depicts retired people under PAYGS as victims of government greed, closely parallels the neoclassical position that interprets the fact that at its inception the US Social Security plan paid out 'benefits to retirees who had paid little or nothing into the system', using fund that could have been otherwise invested, as a cause of a '*major* reduction in the capital stock' (Kotlikoff, 1979, pp. 237, 248). Probably involuntarily, Baker & Weisbrot end up accepting the argument that PAYGS is an

unsound pension system, but has to be defended as 'something of an accident of history', as Blinder (1988, p. 25) puts it, something that carries on 'a deep kind of hysteresis ..., for if you start a pay-as-you-go system, switching to a funded system is extremely difficult.'

Once a neoclassical approach is accepted, there is a more direct way to defend the idea of the 'trust fund' as a real thing. In particular Schultze (1990, p. 18) has suggested that any current budget surplus, *for instance* a SS surplus, by crowding in private investment *now* and increasing aggregate per capita capital and income, will ease the pensions burden *later*, in the unfortunate event of a depletion of the trust fund. This depletion will cause a fall in per capita capital and income, but it will do that by eating up, in a literal sense, precisely what it helped to create. Summarising this position, Thompson points out that

> the Treasury, as Social Security banker, receives a net cash inflow when Social Security runs a surplus and experiences a net cash outflow when it runs a deficit. If not offset by a deficit in other Treasury operations, Social Security surpluses produce a positive overall net cash flow for the Federal government, allow the Treasury to reduce the value of Federal debt in the hands of the public, and increase national saving. ... Note that it is an overall budget surplus that counts, not whether the surplus is in the Social Security program or elsewhere. … [A] higher national saving rate today could help to offset the increase in future Social Security costs, leaving tomorrow's workers no worse off …than if the demographic shift had not occurred. In other words, we can 'advance fund' the burden of the demographic shift by assuring that the scheduled Social Security surpluses translate into increased capital formation. (1990, p. 44) [13]

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13 White (2000) extends, not always in a clear manner, this argument to interest payments on Treasury bonds. He argues that since the interest paid by the Treasury on the bonds held by the fund are recorded as outlays by the Treasury and as receipts by the SS, then they have a nil effect on the general budget. However, the public sector is saving on its current interest payments (the payments it would have had to make if the bonds were held by the general public) and the 'money not borrowed now may instead be used for investment that may create a larger economy in the future' that 'may make paying Social Security benefits marginally easier' (ibid., p. 8). This investment will be eaten up once, the principal having been eroded, the portion of the trust fund that consists of the notional accumulation of interest also starts to be depleted. Blinder wrongly argues that 'the trust

Various objection have been raised, also by its proponents, to this argument — for instance that future generations will not remember that their higher income was due to the sacrifices of previous generations that led to the trust fund formation; or that the SS surplus might be used to finance a larger extra-pension deficit. Perhaps in consequence of these objections, most of the current debate in the US is about the proposal to employ the current Social Security surplus *directly* to buy private assets so that the 'trust fund' which, as we have seen, is currently held in government bonds, would become a real 'reserve fund', as in a private life-insurance (saving) plan (cf. e.g. Feldstein, 1998; Aaron & Shoven, 1999; Diamond, 1999). The issue at stake is whether the surplus should be managed by SS directly, or transferred to privately managed accounts.

Irrespective of who manages the SS surplus, it should be clear from the above that it is not the case that the surplus is directly invested in private assets that would boost national saving and investment. According to neoclassical principles, given the 'natural' level of income, if the public sector goes into surplus, this would *crowd in* private investment anyway. To get this result it is not necessary for the surplus to be invested *directly* in private assets. The government just has to return part of its stock of debt to the private sector, which will employ the additional liquidity to demand additional private assets; in the meantime, interest rates will fall, boosting private investment. If the government uses the surplus to buy private assets, or transfers the surplus to privately managed pension funds it is only doing what the private sector would have done anyway by itself. The main result is that in both ways national saving is raised by the amount of the SS surplus, irrespective of how this is channelled into the saving-investment market (cf. Cutler, 1999, pp. 127–128).[14] Most

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fund's interest earnings, which are simply paid from one government account to another … have nothing at all to do with the overall fiscal deficit and therefore nothing at all to do with the balance of saving and investment in the economy' (1990, p. 138).

14 There are, however, consequences for the distribution of the returns on financial wealth. Compared to the case in which an SS surplus is simply allowed to crowd in private investment and

recently, this kind of argument has been used by Aaron et al. (2001, pp. 13-16) in their criticism of a report of President Bush's Social Security commission. It is on this conclusion, firmly grounded in the neoclassical causal relationship that runs from saving to investment, that the attention of non-orthodox economists should focus. Once that causal link is rejected, the economic evaluation of the SS 'trust fund' radically changes. In a Keynesian perspective any surplus in one portion of the government budget, if not compensated by equal deficits in other portions, has depressive effects on employment. So, *ceteris paribus*, the formation of a SS surplus far from being a safe belt for PAYGS — as Baker & Weisbrot (1999) argue — would undermine its very economic foundations. In Section 5.2 we will provide arguments to show why the neoclassical saving-investment causal link should be rejected and the Keynesian perspective adopted.

4.5 *Feldstein's and Modigliani's Transition Models*

A minority of American economists propose a complete substitution of PAYGS with a CS. These economists present 'transition models' that, they claim, would allow a smooth changeover from PAYGS to CS.[15] Modigliani, Ceprini & Muralidhar (1999) admit that 'there are costs in the

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the SS 'trust fund' is held in government bonds, if the SS surplus is directly invested by SS or by privately managed accounts in private assets, it is as though contributors to PAYGS held more of these assets and less government bonds. Symmetrically private investment funds will hold more government bonds and less private assets. In general the rate of return on private assets is higher than that on treasury bonds. As a result, the rate of return obtained by contributors will be higher, and that obtained by private investors lower (see Aaron & Shoven, 1999, p. 29; Cutler, 1999; Gale, 1997, pp. 74–75). Gale notes that the switch towards private assets 'could possibly raise government borrowing rates, which would increase government borrowing further' (ibid.).

15 An early plan put forward by Feldstein (1996) proposed, in essence, to freeze pension benefits and contributions at their current *levels*, in other words to keep Samuelson's biological rate of return λ at zero. This means that if the economy grows at a rate λ, this could allow the contribution rate α to fall. Instead of letting α fall, the plan prescribes that the contribution rate should be held

transition from the PAYGS to the funded system as saving needs to be boosted, at least temporarily.' Looking at the American experience, they assume that T^{con} are raised in order to obtain a SS surplus. This surplus can then be placed in individual accounts managed by private (or public) pension funds that invest in private assets. As we have seen, this idea is endorsed by most mainstream American economists. Feldstein & Samwick (1998) and Modigliani, Ceprini & Muralidhar (1999), however, go further, envisaging the opportunity of a slow but progressive substitution of PAYGS with a CS. They rely on the power of the compound interest accruing on financial investment.

A simple numerical example may give the flavour of these plans (see Table 1). We have a stationary economy with three overlapping generations: *a, b, c,* in order of age (*a* is the oldest etc). Each generation works for two periods and retires in the last. We need only consider one representative worker for each generation. To simplify, the Samuelsonian *biological* rate of return is set to zero: $\lambda = 0$. The real wage is w = \$200 and the per capita pension is B = \$100. The rate of return on private assets is i = 100% (the constancy of w and i during the transition is a simplification reconsidered later in Section 5.2).

[Table 1 here]

In period $t = 0$ only PAYGS existed. The contribution rate to PAYGS was 0.25, enough to collect T^{con} equal to B. In period $t = 1$ generations *b* and *c* are called upon to contribute an additional share of their wage to mandatory pension funds. We have calculated the contribution rates in order that their total for the two generations is equal, and enough to obtain the same expected pension benefit got under PAYGS. The total contribution rate is now 0.35. Pension funds invest in private assets. Generations *b* and *c* are subject to a double charge since they still have to

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constant by diverting the newly disposable income as mandatory savings towards private (or

contribute to PAYGS while building their pension under a CS. Note that the story could be told in term of the building of an SS trust fund. It is enough to suppose that the larger contribution flow goes to SS which uses it — as Feldstein and Modigliani would like — to foster private capital accumulation. In both ways, what will happen in $t = 2$ is that only half of the pension to generation *b* is paid on the basis of contributions to PAYG, the other half being the result of the one period capitalisation of contributions to CS. The total contribution rate therefore falls to 0.21, below the pre-reform level. Finally, in the last period all the pension to generation *d* is paid on the basis of the capitalisation of its contributions to CS, so that there is no longer any need for mandatory contributions to PAYGS, which can thus be abolished. The final contribution rate is 0.083. Once the transition is completed the same pension paid under a PAYGS régime can be paid through a CS but with just half the contribution rate. This appealing result is the outcome, of course, of the power of compound interest. Given the profile of the present paper, we do not discuss here the realism of the assumptions made by the authors who advocate this plan, but only its theoretical background.[16] This brings us back again to the neoclassical causal link between saving and investment. Before we examine (at last!) this central and controversial issue let us discuss the criteria for comparing the relative advantages of adopting one or the other pension system.

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publicly managed, for that matter) pension funds that invest them in private assets.

16 A comparison of their respective results was made by Modigliani in a letter to *The Economist* (April 1999): a real rate of return of 5% (Modigliani) or 5.5% (Feldstein) and a contribution by the SS surplus equal to 4.5% (Modigliani) or 2.3% (Feldstein) of the taxable wages for 15 years (Modigliani) or 30 years (Feldstein) are assumed. After 50 years the level of benefits initially guaranteed by PAYGS would be assured by a contribution rate of 5% (Modigliani) or 14% (Feldstein) as against 17% of PAYGS.

5. Criteria for Choosing between PAYGS and CS

5.1 Aaron's Criterion

One widely debated criterion for judging the comparative advantages of the choice between different pension plans is to compare the respective rates of return that participants receive in the two systems. We name this 'Aaron's criterion' after Aaron (1966). This economist follows the Samuelsonian fiction of PAYGS as a 'virtual' individual pension scheme. The N_t^y identical potential participants compare the advantage of investing $T_t^{con} = \alpha_t w_{t-1} N_t^y$ in PAYGS or, alternatively, $S_t^w = \alpha_t w_{t-1} N_t^y$ in a proper individual old-age insurance scheme. In the first case, given $\lambda > 0$, that is, a positive biological 'rate of return' associated with PAYGS, the consumption when old will be $C_{t+1}^{paygs} = T_t^{con}(1+\lambda)$. In the other case, given the interest (profit) rate i, $C_{t+1}^{cs} = S_t^w(1+i)$. The relative advantage depends on whether i is higher or lower than λ. For instance, in the example of Table 1, with $\lambda = 0$ and $i = 100\%$, there is a clear advantage, *à régime*, of adopting a CS. However if $\lambda > i > 0$, a constant per capita pension could be paid under PAYGS at a lower contribution rate than with CS.

As a result, empirical and theoretical debate has focused on the relationship between λ and i. The pro-PAYGS front argues that, whatever the past results, in the long run the rate of return on private investment is uncertain, or in any case its cyclical behaviour arbitrarily benefits some generations and harms others. It is also maintained that taxes and administrative costs should be subtracted from the *gross* rate. The pro-CS front argues that both the past results and the theoretical outcomes of neoclassical theory support the idea that $i > \lambda$. As is often the case, the empirical evidence does not provide any clear-cut answers. Nor have the theoretical arguments been decisive.[17]

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17 As is well known, according to Phelps's golden rule, in the Solow–Swann growth model the maximum per capita consumption level is reached if, in the steady state, all profits are accumulated

But whatever the relationship between i and λ, what can be said about the usefulness of Aaron's criterion? Aaron unduly extends the case of an *individual* who decides whether to adhere to PAYGS or to CS to an *aggregate* decision of the community between the two systems, forgetting (i) that the intricacies of the transition between the two systems discussed in the preceding sections, and (ii) that a rise of the saving rate has significant *macroeconomic* implication, for instance on w, i and on employment. These implications are examined in a neoclassical perspective by Feldstein (1974).

5.2 Feldstein's Criterion

Feldstein (1974) supposes that workers have to decide whether to use a wage increase in creating (or extending) a PAYGS or a CS. What are the macroeconomic outcomes of the choice? Feldstein

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so that the growth rate of the capital stock is equal to the marginal productivity of capital (or natural interest rate), that is, if $i = \lambda$ (golden rule). Only by chance, or as a result of policy, will the saving rate be such as to realise the golden rule. If the community has a higher saving rate, there is oversaving or dynamic *inefficiency*, in the sense that too much capital is accumulated in order to reach the same long-period per capita consumption that could have been realised with a lower saving rate. This case is associated with $i < \lambda$. Curiously in this case neoclassical theory would prescribe the creation of PAYGS in order to reduce capital accumulation (Samuelson, 1965). The case $i > \lambda$ is associated with dynamic *efficiency*. In order to see whether this is true empirically, one has to estimate i. After Wicksell, it has generally been supposed by neoclassical economists that the proper aim of the monetary authorities is to manage the monetary interest rate in order to approximate the natural rate of interest. The 'safe' rate of interest on short-term government bonds, which is subject to the manoeuvring of the monetary authorities, has been taken as a proxy for i. However, some empirical studies (quoted by Abel et al., 1989) show that historically i has generally been lower than λ and that accordingly industrial economies have been inefficient. Then, PAYGS reduces dynamic inefficiency. By way of comparison note that in a non-orthodox approach the profit rate may well be higher than the growth rate, and that this has no efficiency implications (see, for example, Stirati, 2001). However, according to the same approach this is practically useless as a criterion for choosing between CS and PAYGS once the negative consequences of the policies devoted to increasing the saving rates are considered.

argues in favour of the second option since if 'Social Security contributions are used to pay concurrent benefits, the capital stock is smaller and income is less' (ibid., p. 923; see also Kotlikoff, 1979). That is, if PAYGS is adopted, a share α of the (additional) total wage bill is transferred to and consumed by the current olds, which could alternatively have been used for capital accumulation.[18] As already seen, according to neoclassical theory, an higher saving rate allows, for a given labour supply, the adoption of more capital intensive techniques, resulting in a higher per capita income. In particular, given the rise in the capital/labour ratio, the marginal productivity of labour and the equilibrium real wage w_t are higher than before and, by the same token, the marginal productivity of capital and the natural rate of interest rate will be lower. According to Feldstein, without the creation of the SS in the US the capital stock there would have been 60% higher. The consequences of having such a higher capital stock, estimated by Feldstein using the same Cobb-Douglas assumption we used in Section 4.1, are levels of total income, real wage and olds' consumption, respectively, 15%, 15% and 14% higher (ibid., pp. 922–924). The interest rate falls to 7%.[19] This lower rate of return on the CS contributions, however, is more than compensated by the rise in the real wage, and with it by the possibility of the workers transferring, at the given contribution rate, a higher amount of savings to the future while enjoying more current consumption. To sum up, in a neoclassical perspective the proper test in deciding whether to allocate a given amount of 'free resources' to PAYGS or CS is not to compare the *ex ante* expected levels of λ and i, but to compare λ with the new level of i that would result from the adoption of CS, call it i_{cs}, *plus* γ, which is the percentage increase of the real wage. PAYGS will be convenient only if $\lambda > i_{cs} + \gamma$.

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18 He remarks that 'The evidence presented in this paper seems ... consistent with the Keynesian view that the aggregate saving would increase as income rose if there were no offsetting government policies' (ibid., p. 922).

19 Not of 28% as reported by Feldstein (ibid., p. 924).

Thus Feldstein's criterion tends to make the case for PAYGS more difficult. This reflects the fact that it is generally difficult to defend PAYGS within a neoclassical perspective. But that theory is weak precisely with respect to the core relationship between saving and investment.

5.3 The Fallacy of the Marginalist Relation between Saving and Investment

The thesis that a given amount of 'free resources' — whether the result of an increase in the national saving rate or of an increase of real wages — would better satisfy the old age foresight motive if devoted to capital accumulation rather than transferred to current olds under PAYGS crucially relies on the neoclassical proposition according to which a rise in the saving rate leads, *ceteris paribus*, to a higher investment rate due the adoption of more capital intensive techniques.

In Chapter 16 of the *General Theory* Keynes (1936, pp. 83–84, p. 211) long ago warned us not to confuse the desire by some individuals to hold more *financial* wealth with an increase in the capital stock:

> The absurd, though universal, idea that an act of individual saving is just as good for effective demand as an act of individual consumption, has been fostered by the fallacy, much more specious than the conclusion derived from it, that an increased desire to hold wealth, being much the same thing as an increased desire to hold investments, must, by increasing the demand for investments, provide a stimulus to their production; so that current investment is promoted by individual saving to the same extent as present consumption is diminished. (Keynes, 1936, p. 211)

This desire, by negatively affecting effective demand and employment, may well decrease the income of other individuals who will be induced to sell their financial assets to the former group. As a result, aggregate financial wealth, and its real counterpart the capital stock, are unaffected. As he explained in Chapter 7:

> It is true that, when an individual saves he increases his own wealth. But the conclusion that he also increases aggregate wealth fails to allow for the possibility that an act of saving may

> react on someone else's savings and hence on someone else's wealth. ... For although the amount of his own saving is unlikely to have any significant influence on his own income, the reactions of the amount of his consumption on the incomes of others makes it impossible for all individuals simultaneously to save any given sums. (ibid., pp. 83–84)[20]

The limits of Keynes's criticism of the conventional theory were pointed out by Hicks, Modigliani and others soon after the publication of *The General Theory*. Indeed Keynes himself did not entirely reject the traditional approach; he mentioned repeatedly in Chapter 16 the possibility that, in principle, a higher saving rate leads to more 'indirect' or capital-intensive production methods. Against this possibility, he argued that the new equilibrium 'might require a method of production so inconveniently "roundabout" as to have an efficiency well below the current rate of interest, [so that] the *immediate* effect of the saving would still be adverse to employment' (ibid., p. 211). Keynes refers here to the rigidity of the *nominal* rate of interest in the presence of a fall of the *natural* rate (to use Wicksell's well-known terminology) that follows the increased supply of saving. Garegnani (1983) has pointed out that Hicks and Modigliani precisely took advantage of the *short-term* nature of that rigidity to re-establish, at least in the long run, the validity of the traditional theory. Garegnani also suggested how the results of the capital theory controversy, raised by Sraffa (1960), can validate the Keynesian principle of the independence of investment from saving.

This controversy showed that it is simply not true that a fall in the interest rate that follows a rise in the saving rate leads to the adoption of more capital intensive techniques. The controversy focused upon the peculiar nature of 'capital' which is not a factor of production measurable in

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[20] Similarly, in Chapter 8 Keynes argues that 'We cannot, as a community, provide for future consumption by financial expedients but only by current physical output. In so far as our social and business organisation separates financial provision for the future from physical provision for the future so that efforts to secure the former do not necessarily carry the latter with them, financial prudence will be liable to diminish aggregate demand and thus impair well-being..." (ibid., pp. 104–105).

some conventional unit that is independent of distribution — as it is the case for labour and land — but consists of commodities measurable only in terms of 'value'. This fact has dramatic consequences with regard to the neoclassical predictions about the direction of factor substitution once their relative value changes. In particular, Sraffa (1960) and the subsequent controversy (see the *Quarterly Journal of Economics* Symposium on paradoxes in capital theory, 1966, and Garegnani, 1970, 1990) have ultimately shown that it is not in general true that a fall of the rate of interest is followed by the adoption by entrepreneurs of more 'capital intensive' techniques. That means that, contrary to what neoclassical theory asserts, an increase in the saving rate can be followed by a fall and not by an increase of investment. As a result '[t]he fall in the demand for "all varieties of physical capital goods" as interest rates fall, will entail that the increase in the decisions to save and the corresponding additional future consumption will *not* materialise for the community in a competitive market' (Garegnani, 2000, p. 38). The same conclusion as was reached by Keynes, although by a different, much weaker route (for an application of the criticism to the recent neoclassical growth theory, see Cesaratto, 1999).

In a Sraffian–Keynesian perspective PAYGS is an institution that has a double linkage with full employment policies: its sustainability depends on them and it is itself an instrument of those policies. This was in fact recognised early on by William Beveridge, whose famous report on the welfare state (1942) 'called for the maintenance of full employment' in order to finance social insurance, but did not rely on Keynesian instruments to achieve that aim (Dimand, 1999, p. 232). He soon came to see that the 'policy of full employment' he was advocating was 'a policy of socializing demand' aimed at attacking directly 'the central weakness of the unplanned market economy,' that is its 'failure to generate a steady state effective demand' (Beveridge, 1944, pp. 190–191). In particular, private consumption could be 'both increased and steadied by State action in re-distributing income by measures of Social Security, and by progressive taxation' (ibid., p. 30). Whereas in a neoclassical perspective PAYGS is a mere sharing of full employment income, and can be detrimental to capital accumulation, in a non-conventional perspective income transfers to

older generations may positively affect aggregate demand and income by sustaining autonomous consumption. After the capital theory controversy this cannot be dismissed, as Aaron (1990–91, p. 171) and other contend, as 'vulgar Keynesianism'. On the contrary, the attempt to raise the average community propensity to save by cutting PAYGS and extending CS may have deflationary effects.

Finally, in a Keynesian–Sraffian approach the links between demography and employment are much looser than in neoclassical theory. In particular there is no causal association between labour supply and employment, so that changes in fertility may mean very little for the sustainability of PAYGS. Increased longevity may affect the tax burden on workers; but, *prima facie*, this has no clear effects of economic growth. Moreover, a lengthening of the working life to ease this burden may have a displacement effect on the job opportunities of the younger generations.

6. Conclusions

Let us finally draws the policy implications of our discussion. The argument presented above may help to answer the following questions.

Is the interpretation of PAYGS in terms of the individual insurance fiction proposed by Samuelson and Aaron theoretically sound, and is it helpful to the defence of that system? No, since PAYGS is not a 'surrogate' of the CS (de Finetti, 1956, p. 284) and the fiction may pave the way to the malevolent assimilation of PAYGS to a Ponzi game. PAYGS consists of a transfer of current income regulated by the prevalent social policy and distribution patterns, and it has no natural 'defined-contribution' status. The alternative interpretation of PAYGS presented in this paper fits well with a non-orthodox view of income distribution — which must be understood to include the living standard of the retired portion of the working class — as determined by the relative strength of the social classes (Garegnani, 1984; Stirati, 1994). It also fits well with the Keynesian view in which the control of social consumption is an instruments for stabilisation and full employment.

Is the US trust fund a guarantee against possible future imbalances in the financial equilibrium of the US SS? No, unless one is ready to accept the neoclassical approach according to which any government saving crowds in private capital investment thus increasing the future resources available to cope with any demographic imbalance. On the contrary, according to non-orthodox economics, a surplus in the government sector has deflationary effects on the economy. In truth, most American economists would like to see the SS trust find directly invested in the private stock market. So the next question is:

In view of future alleged changes in the proportion between the working population and retirees, is a partial or total transition to CS a solution? No. The alarm about the ability of developed economies to cope with these changes may well be excessive, as others have pointed out (Baker & Weisbrot, 1999). The specific contribution of this paper has been to show that the solution would be worse than the alleged evil it wants to cure. To begin with, it has been shown that there is no easy transition from PAYGS to CS. According to the conventional argument in favour of CS, an unfortunate result of the democratic political process is that politicians look for immediate consensus, so that the interests of future generations are sacrificed to those of the present generation. But suppose that forward-looking politicians and electorates approve the reform: are the alleged future advantages there to be harvested? Once Keynes's criticism of the conventional relationship between saving and investment, later reinforced by the outcomes of the capital theory controversy, are taken into account, not only can we see that those advantages do not exist, but it also becomes clear that policies designed to raise the saving rate can will depress current income and employment.

Does this paper offer a proposal for pension reform? No. It criticises the economic bases of the prevailing reform proposals. In particular, it uses non-orthodox Keynesian and Sraffian economics both to criticise Samuelson's view of PAYGS and Feldstein's promotion of CS, which together constitute the conventional wisdom. In so doing, it contributes to the demolition of some myths, from a more radical non-neoclassical perspective than Orszag & Stiglitz (1999). It argues

that the attempt to establish a CS is not just a painful process (current private or collective consumption, or both, must fall), but also that such a policy is doomed to fail and can depress the economy, given that investment is independent of saving. The attempt in the US to raise the marginal propensity to save by persuading people to contribute to private pension funds may have had the effect of fuelling a speculative bubble financed by easy access to bank liquidity. The wealth effects and the diffusion of consumer credit appear to have offset the initial deflationary effect. One may perhaps envisage here some positive effects of the advocacy of CS. But these effects are best explained by Keynesian and not neoclassical theory (Steindl, 1990, 1998). Moreover, the instability of consumer demand based on financial bubbles vindicates Beveridge's proposal to stabilise effective demand by socialising consumers demand. The paper also suggests that demographic trends as such are not a peril for PAYGS, since employment does not depend on the labour supply (if anything there is a reverse dependence). It must also be observed that over the long run the capitalist economies have never suffered problems of labour supply. Finally, any possible increase in the burden imposed on the working population by pensioners has no systematic relation to economic growth; it should instead be viewed as a problem of social choice, one likely to be eased by growing technical progress and by the pursuit of environmentally sustainable economic growth and income distribution biased towards the working class.

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Table 1 - Feldstein's-Modigliani transition model

periods	Generations		Contributions		Contribution rates			Benefits	
			to PAYGS [1]	to CS [2]	to PAYGS [3]	to CS [4]	total [5]	from PAYGS [6] = [1]	from CS [7]
t = 0	*c*	*(workers)*	50	0	0,25	0	0,25		
	b	*(workers)*	50	0	0,25	0	0,25		
	a	*(retirees)*						100	0
t = 1	*d*		54,1	16,7	0,27	0,083	0,35		
	c		45,9	25	0,23	0,13	0,35		
	b							100	0
t = 2	*e*		25	16,7	0,125	0,083	0,21		
	d		25	16,7	0,125	0,083	0,21		
	c							50	50
t = 2	*f*		0	16,7	0	0,083	0,083		
	e		0	16,7	0	0,083	0,083		
	d							0	100

Assumptions: w = $200, i = 100%.